

REMARKS

Reconsideration of this application, as amended, is requested.

Claims 1-5 remain in the application. Independent claims 1 and 3 have been amended to define the invention more clearly. In this regard, the original long preamble in each of independent claims 1 and 3 was worded awkwardly and was intended to define the environment in which the method will be carried out. Independent claims 1 and 3 have been amended to positively recite a method step of providing the fan clutch, with the elements of the fan clutch defined more clearly. Dependent claims 2 and 4 have been amended to conform to amended independent claims 1 and 3 respectively.

The Office Action of November 25, 2008 had rejected the claims as being obvious over Martin et al. (US4,556,138) considered in view of Shiozaki et al. (US6,550,596). The Examiner appears to have concluded that the amendment filed on May 19, 2009 overcame the rejection based on the Martin et al./Shiozaki et al. combination. However, the Office Action of July 30, 2009 turned to the newly cited Watanabe (US6,247,567) and Creger et al. (US5,467,854) references. The Examiner concluded that a combination of these four references would suggest the previously presented claims.

Counsel and the assignee thank the Examiner for the very helpful comments in the Response to Arguments section of the Office Action. There the Examiner explained that the Martin et al. reference is cited for its teaching of a valve member and the electromagnet assembly. The Examiner acknowledges that the Shiozaki et al. valve and magnet assembly works in a reverse manner. However, the

Examiner explains that Shiozaki et al. and the newly cited Watanabe and Creger et al. references were cited for allegedly using the various claimed control parameters for adjusting the fan speed in the Martin et al. assembly.

The assignee does not dispute that the prior art includes many fan fluids clutches that measure various control parameters of a vehicle and use those control parameters with an electromagnet in an effort to match the fan rotation with the cooling needs of the vehicle.

The subject application explains in the paragraph bridging pages 2 and 3 that the conventional external control type fan-coupling device has a structure in which the electromagnet and an armature for operating the valve member are separated by the case of the non-magnetic material. As a result, magnetic force of the electromagnet is not transmitted efficiently to the armature. Accordingly, excessive electromagnetic force is required to attract the armature and the size and weight of the electromagnet are increased. As a result, a compact light weight arrangement with low electric power consumption was defined as an object of the subject invention. The subject application also explains that the admitted prior art includes the armature at a location where oil will always be present. Hence, the presence of the oil impedes the movement of the armature toward the electromagnet.

The invention defined by the amended claims addresses these deficiencies in the admitted prior art. In particular, the amended independent claims now positively recite a step of providing a rotating shaft and drive disk fixed to the rotating shaft. The claimed method further includes providing a housing supported through a bearing of the rotating shaft. The housing has an interior and a partition plate

in the housing partitions the interior of the housing into an oil reservoir chamber and a torque transmission chamber. The method further includes providing a torque transmission gap between the drive disk and the housing at locations spaced outwardly from the rotating shaft. An oil circulating flow passage is defined as extending through the partition plate inwardly of the torque transmission gap. The method further includes providing a valve member comprising a spring material and having a fixed end, a free end radially outwardly from the fixed end and aligned with the oil circulating flow passage and an armature between the fixed and free ends. An electromagnet is supported by the rotating shaft body through a bearing on the oil reservoir chamber side of the housing. The method defined by the amended claims proceeds with utilizing a spring characteristic of the spring material of the valve member for biasing the valve member against the partition plate to keep the oil circulating flow passage in a normally closed condition while keeping the valve member substantially free of magnetic forces. The method continues by detecting a plurality of signals for determining a desired rotational speed of the housing. The method continues by operating the electromagnet in response to signals indicating a need for increased rotational speed of the housing for attracting the armature of the valve member and deflecting the valve member away from the partition plate for opening the oil circulation flow passage to permit a flow of oil through the oil circulating flow passage and radially outwardly into the torque transmission clearance. The method further includes selectively turning off the electromagnet in response to signals indicative of the requirement for a slower rotational speed so that the valve member is sufficiently free of magnetic forces and biased into the normally closed condition.

The Martin et al. reference corresponds closely to the admitted prior art and has the deficiencies of the admitted prior art discussed above. In this regard, the electromagnet is disposed at a radially outer position and is aligned with an oil overflow hole at a radially outer position. Additionally, the electromagnet is separated from the valve member by the housing. The outer position of the electromagnet is mechanically and dynamically unwieldy and is at a position where the electromagnet will act on a portion of the valve where fluid normally will be present. As a result, the valve will be less responsive and the Martin et al. arrangement suffers from problems of high weight and large size as described in the subject application. Furthermore, the Martin et al. method urges oil into a radially outer position on the drive disk and hence permits a flow of oil into an area of the torque transmission gap where oil will already be present due to centrifugal forces generated in the rotating housing. Hence, additional oil will flow into the torque transmission gap only by displacing the present oil in a direction opposed to the centrifugal force. Accordingly, the Martin et al. arrangement has the size, weight and performance inefficiencies described in the prior art.

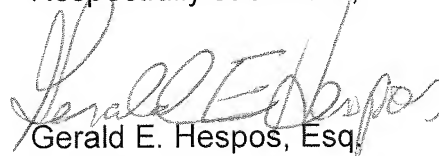
As noted in the previous responses, the assignee's earlier Shiozaki et al. reference functions entirely differently, and those functional differences are very significant in the context of the method claims as amended. Furthermore, Watanabe does not use an circulation hole and a valve, but rather uses the magnet to move an entire movable disc 6 toward or away from the drive disc 4. The Creger et al. reference relates to an entirely different type of transmission. The various control parameters mentioned in Shiozaki et al., Watanabe and Creger et al. do not overcome the inherent operational inefficiencies of the method taught by Martin et al. Hence, it is submitted

that the invention defined by amended independent claims 1 and 3 is not taught or suggested by Martin et al. in view of Shiozaki et al., Watanabe and Creger et al.

The above-described efficiencies of the method defined by amended independent claims 1 and 3 is enhanced even further by claims 2 and 4. In this regard, claims 2 and 4 include providing a magnetic material of ring shape between the electromagnet and the armature by assembling the magnetic material into the housing so as to transmit a magnetic flux of the electromagnet to the valve member through the magnetic material. As explained in the subject application, this unique arrangement enables the electromagnet to control the operation of the valve member precisely, while still achieving the desired low weight and small size.

In view of the preceding amendments and remarks, it is submitted that the invention defined by the amended claims is not taught or suggested by Martin et al. considered in view of Shiozaki et al., Watanabe and Creger et al. Accordingly, it is believed that the amended claims are directed to patentable subject matter and allowance is solicited. The Examiner is urged to contact applicant's attorney at the number below to expedite the prosecution of this application.

Respectfully submitted,



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Date: December 30, 2009